

CLAIMS

What is claimed is:

- 1 1. A method to look up a plurality of data items indexed by a vector of indices,
2 the method comprising:
3 generating a second vector of indices in a vector register, each index of the
4 second vector of indices being one of a first vector of indices, at least
5 one index in the first vector of indices being replicated as a plurality
6 of duplicated indices in the second vector of indices; and
7 looking up simultaneously a first vector of data items from a plurality of look
8 up tables using the second vector of indices.

- 1 2. A method as in claim 1 wherein the plurality of duplicated indices in the
2 second vector of indices are grouped together for looking up respectively a
3 plurality of bit segments of one data item in the first vector of data items.

- 1 3. A method as in claim 2 wherein the second vector is generated by at least
2 one of:
3 a) a vector merge operation; and
4 b) a vector permutation operation.

- 1 4. A method as in claim 1 wherein a group of indices in the first vector of

2 indices is replicated as a plurality of duplicated groups of indices in the
3 second vector of indices.

1 5. A method as in claim 4 wherein the second vector of indices is generated by
2 a vector permutation operation.

1 6. A method as in claim 4 further comprising:
2 storing a plurality of groups of data items in the first vector of data items into
3 different vectors respectively, the plurality of groups of data items
4 being looked up using the plurality of duplicated groups of indices
5 respectively.

1 7. A method to look up a plurality of data items indexed by a plurality of
2 vectors of indices, the method comprising:
3 generating a second vector of indices in a vector register, each index of the
4 second vector being one index of a plurality of vectors of indices, at
5 least one index in each vector of the plurality of vectors of indices
6 being replicated as an index in the second vector; and
7 looking up simultaneously a first vector of data items from a plurality of look
8 up tables using the second vector of indices.

1 8. A method as in claim 7 wherein at least one index in one vector of the
2 plurality of vectors of indices are replicated as a plurality of duplicated

3 indices in the second vector.

1 9. A method as in claim 8 wherein the plurality of duplicated indices in the
2 second vector of indices are grouped together for looking up respectively a
3 plurality of bit segments of one data item in the first vector of data items.

1 10. A method as in claim 7 wherein a group of indices in each vector of the
2 plurality of vectors of indices are replicated respectively as a group of
3 indices in the second vector of indices.

1 11. A method as in claim 10 further comprising:
2 storing a plurality of groups of data items in the first vector of data items into
3 different vectors respectively, each of the plurality of groups of data
4 items being looked up using a group of indices in the second vector
5 of indices which is replicated from a group of indices in one vector of
6 the plurality of vectors of indices.

1 12. A machine readable media containing executable computer program
2 instructions which when executed by a digital processing system cause said
3 system to perform a method to look up a plurality of data items indexed by a
4 vector of indices, the method comprising:
5 generating a second vector of indices in a vector register, each index of the
6 second vector of indices being one of a first vector of indices, at least

7 one index in the first vector of indices being replicated as a plurality
8 of duplicated indices in the second vector of indices; and
9 looking up simultaneously a first vector of data items from a plurality of look
10 up tables using the second vector of indices.

1 13. A media as in claim 12 wherein the plurality of duplicated indices in the
2 second vector of indices are grouped together for looking up respectively a
3 plurality of bit segments of one data item in the first vector of data items.

1 14. A media as in claim 13 wherein the second vector is generated by at least one
2 of:
3 a) a vector merge operation; and
4 b) a vector permutation operation.

1 15. A media as in claim 12 wherein a group of indices in the first vector of
2 indices is replicated as a plurality of duplicated groups of indices in the
3 second vector of indices.

1 16. A media as in claim 15 wherein the second vector of indices is generated by
2 a vector permutation operation.

1 17. A media as in claim 15 wherein the method further comprises:
2 storing a plurality of groups of data items in the first vector of data items into

3 different vectors respectively, the plurality of groups of data items
4 being looked up using the plurality of duplicated groups of indices
5 respectively.

1 18. A machine readable media containing executable computer program
2 instructions which when executed by a digital processing system cause said
3 system to perform a method to look up a pluralities of data items indexed by
4 a plurality of vectors of indices, the method comprising:
5 generating a second vector of indices in a vector register, each index of the
6 second vector being one index of a plurality of vectors of indices, at
7 least one index in each vector of the plurality of vectors of indices
8 being replicated as an index in the second vector; and
9 looking up simultaneously a first vector of data items from a plurality of look
10 up tables using the second vector of indices.

1 19. A media as in claim 18 wherein at least one index in one vector of the
2 plurality of vectors of indices are replicated as a plurality of duplicated
3 indices in the second vector.

1 20. A media as in claim 19 wherein the plurality of duplicated indices in the
2 second vector of indices are grouped together for looking up respectively a
3 plurality of bit segments of one data item in the first vector of data items.

1 21. A media as in claim 18 wherein a group of indices in each vector of the
2 plurality of vectors of indices are replicated respectively as a group of
3 indices in the second vector of indices.

1 22. A media as in claim 21 wherein the method further comprises:
2 storing a plurality of groups of data items in the first vector of data items into
3 different vectors respectively, each of the plurality of groups of data
4 items being looked up using a group of indices in the second vector
5 of indices which is replicated from a group of indices in one vector of
6 the plurality of vectors of indices.

1 23. A processing system to look up a plurality of data items indexed by a vector
2 of indices, the system comprising:
3 means for generating a second vector of indices in a vector register, each
4 index of the second vector of indices being one of a first vector of
5 indices, at least one index in the first vector of indices being
6 replicated as a plurality of duplicated indices in the second vector of
7 indices; and
8 means for looking up simultaneously a first vector of data items from a
9 plurality of look up tables using the second vector of indices.

1 24. A processing system as in claim 23 wherein the plurality of duplicated

2 indices in the second vector of indices are grouped together for looking up
3 respectively a plurality of bit segments of one data item in the first vector of
4 data items.

1 25. A processing system as in claim 24 wherein the second vector is generated
2 by at least one of:
3 a) a vector merge operation; and
4 b) a vector permutation operation.

1 26. A processing system as in claim 23 wherein a group of indices in the first
2 vector of indices is replicated as a plurality of duplicated groups of indices in
3 the second vector of indices.

1 27. A processing system as in claim 26 wherein the second vector of indices is
2 generated by a vector permutation operation.

1 28. A processing system as in claim 26 further comprising:
2 means for storing a plurality of groups of data items in the first vector of data
3 items into different vectors respectively, the plurality of groups of
4 data items being looked up using the plurality of duplicated groups of
5 indices respectively.

1 29. A processing system to look up a pluralities of data items indexed by a

2 plurality of vectors of indices, the system comprising:
3 means for generating a second vector of indices in a vector register, each
4 index of the second vector being one index of a plurality of vectors of
5 indices, at least one index in each vector of the plurality of vectors of
6 indices being replicated as an index in the second vector; and
7 means for looking up simultaneously a first vector of data items from a
8 plurality of look up tables using the second vector of indices.

1 30. A processing system as in claim 29 wherein at least one index in one vector
2 of the plurality of vectors of indices are replicated as a plurality of duplicated
3 indices in the second vector.

1 31. A processing system as in claim 30 wherein the plurality of duplicated
2 indices in the second vector of indices are grouped together for looking up
3 respectively a plurality of bit segments of one data item in the first vector of
4 data items.

1 32. A processing system as in claim 29 wherein a group of indices in each vector
2 of the plurality of vectors of indices are replicated respectively as a group of
3 indices in the second vector of indices.

1 33. A processing system as in claim 32 further comprising:
2 means for storing a plurality of groups of data items in the first vector of data

3 items into different vectors respectively, each of the plurality of
4 groups of data items being looked up using a group of indices in the
5 second vector of indices which is replicated from a group of indices
6 in one vector of the plurality of vectors of indices.

1 34. A processing system to look up a plurality of data items indexed by a vector
2 of indices, the system comprising:
3 a vector register file comprising a plurality of vector registers;
4 a vector processing unit coupled to the vector register file, the vector
5 processing unit comprising a vector look up unit adapted to look up a
6 vector of data items simultaneously, the vector processing unit:
7 generating a second vector of indices in a vector register in the vector
8 register file, each index of the second vector of indices being one of a
9 first vector of indices, at least one index in the first vector of indices
10 being replicated as a plurality of duplicated indices in the second
11 vector of indices; and
12 looking up simultaneously a first vector of data items from a plurality of look
13 up tables using the second vector of indices in the vector look up unit.

1 35. A processing system as in claim 34 wherein the plurality of duplicated
2 indices in the second vector of indices are grouped together for looking up
3 respectively a plurality of bit segments of one data item in the first vector of
4 data items.

1 36. A processing system as in claim 35 wherein the second vector is generated
2 by the vector processing unit executing at least one of:
3 a) a vector merge operation; and
4 b) a vector permutation operation.

1 37. A processing system as in claim 34 wherein a group of indices in the first
2 vector of indices is replicated as a plurality of duplicated groups of indices in
3 the second vector of indices.

1 38. A processing system as in claim 37 wherein the second vector of indices is
2 generated by a vector permutation operation.

1 39. A processing system as in claim 37 wherein the vector processing unit stores
2 a plurality of groups of data items in the first vector of data items into
3 different vectors respectively, the plurality of groups of data items being
4 looked up using the plurality of duplicated groups of indices respectively.

1 40. A processing system to look up a pluralities of data items indexed by a
2 plurality of vectors of indices, the system comprising:
3 a vector register file comprising a plurality of vector registers;
4 a vector processing unit coupled to the vector register file, the vector
5 processing unit comprising a vector look up unit adapted to look up a

6 vector of data items simultaneously, the vector processing unit:
7 generating a second vector of indices in a vector register in the register file,
8 each index of the second vector being one index of a plurality of
9 vectors of indices, at least one index in each vector of the plurality of
10 vectors of indices being replicated as an index in the second vector;
11 and
12 looking up simultaneously a first vector of data items from a plurality of look
13 up tables using the second vector of indices in the vector look up unit.

- 1 41. A processing system as in claim 40 wherein at least one index in one vector
2 of the plurality of vectors of indices are replicated as a plurality of duplicated
3 indices in the second vector.
- 1 42. A processing system as in claim 41 wherein the plurality of duplicated
2 indices in the second vector of indices are grouped together for looking up
3 respectively a plurality of bit segments of one data item in the first vector of
4 data items.
- 1 43. A processing system as in claim 40 wherein a group of indices in each vector
2 of the plurality of vectors of indices are replicated respectively as a group of
3 indices in the second vector of indices.

1 44. A processing system as in claim 43 wherein the vector processing unit stores
2 a plurality of groups of data items in the first vector of data items into
3 different vectors respectively, each of the plurality of groups of data items
4 being looked up using a group of indices in the second vector of indices
5 which is replicated from a group of indices in one vector of the plurality of
6 vectors of indices.